

AIR POLLUTION DUE TO VEHICULAR EMISSIONS IN BANGALORE CITY

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ABSTRACT

With this paper an attempt has been made to cover the in depth study of the vehicular population in the Bangalore city, that includes statistical view of number of automobiles, and their exhaust emissions, effects of exhaust on the environment. Although present day demands more use of these automobiles, few remedial suggestions have been made to counter these air polluting problem and finding the answers. This will finally focus on the attempt on the effects due to increase in the vehicle ratio in the city. Based on the facts and data obtained, the scenario regarding future vehicle growth and their impact for travel is discussed to overcome emissions problems. The main objective is based on the Air pollution from emission of vehicles and their problems. In future vehicle-based emissions testing should be conducted for at least once in three months in Bangalore to gain a more accurate picture of the emissions that occur from the specific vehicles in this city. Also the health concerns faced by the citizens of the Bangalore city is been discussed.

Keywords - pollution, vehicular emissions, air pollution

INTRODUCTION

At the global level, the rapid growth in motor vehicle directly or indirectly and climate change implications. The transport sector already consumes nearly half of the world's oil. But in urban areas – both developing and developed countries, it is predominately mobile or vehicular pollution that contributes to air quality problem.

The sources of pollutants includes exhaust given out by motor vehicles and industrial exhausts, domestic cooking and unconventional burning as a part of tradition

and heating, and high dust levels due to local construction and ruff terrains, smoking, and long-range transport. By this the quality of air has become excessively toxicities; Hence Bangalore faces the risk of both high emissions from the vehicles and unfavourable conditions.

The rapid growth in motor vehicle activity has become a grave challenge to be solved in Bangalore during the last and this decade. This has brought a serious range of socio-economic, environmental, health, and welfare impacts on environmental degradation. The study of rapid growth of motor vehicles in Bangalore is important not only because of their locally harmful air pollution effects, but also because of their regional and global impacts, Hence this project deals with the study of air pollution caused by the automobiles in the city of Bangalore. Transportation is one of the important of economic activity and beneficial social interactions. While the transportation sector is also a major source of air pollution in Bangalore, estimated to account for nearly all of carbon monoxide (CO), more than 80% of nitrogen oxides (NO_x), 40% of volatile organic compounds (VOC), 20% of sulphur dioxide (SO₂), and 35% of PM₁₀. The growing problems related to traffic are congestion; accidents, pollution and lack of security are also very worrisome. The key question is how to reduce the adverse the environmental impact and negative effects of transportation without giving up the benefits of transportation. This is due to increase in the automobiles and mobility

of people, rapid urban growth, which is likely to increase the travel demand significant in Bangalore city.

Giving current trends, by 2020 the Bangalore city will have 1.3crore population will reach the second largest city including the nearby cities of other states, capitals such as Delhi, Hyderabad, Chennai in India by 2030.

By July 2018, 1.99crore vehicles were registered in Karnataka. Bangalore Urban district, with 10 Regional Transport Offices, Continued to lead in the number of vehicles at 76.2 lakh. The transport department's records till July 31 this year show the state has 1.99crore vehicles, recording nearly 100% raise in seven years.

Going by the annual vehicle growth rate of 8-10%, the number would have crossed 2crores by September-end. Of the 1.99 crore vehicles.

TOTAL EMISSION LOAD FROM DIFFERENT SOURCES

	PM10	%Contribution	NOx	SO2
Transport	22.4	42	146.36	2.31
Road dust	10.9	20	0.0	0.0
Domestic	1.8	3	2.73	0.68
DG Set	3.6	7	50.96	3.35
Industry	7.8	14	17.19	8.21
Hotel	0.1	-	0.20	0.02
Construction	7.7	14	0.0	0.0
Total	54.4	100	217.4	14.6

LITERATURE SURVEY

This Paper has made an attempt to study on urban air pollution in Bangalore city by emission of gases by vehicles which emit from them. The present day environment crisis demands a change in attitude, which initiatives can be taken to rescue environment from destruction in the city of Bangalore. But the urban areas have a big share in the present day environmental problems from the automobiles throughout the world. This will finally focus on the attempt on the effect due to increase in the vehicle ratio in the city.

The sources of pollutants includes emissions from the combustion of fossil fuels in motor vehicles and for industrial processes, energy production, domestic cooking and heating, and high dust levels due to local construction, smoking, unpaved roads, sweeping, hotels, restaurants and long-range transport. By this the quality of air has become so poor that, Bangalore is the result of both high emissions from the vehicles and unfavourable conditions.

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At the global level, the rapid growth in motor vehicle directly or indirectly and climate change implications. The transport sector already consumes nearly half of the world's oil. But in urban areas – both developing and developed countries, it is predominately mobile or vehicular pollution that contributes to air quality problem.

The rapid growth in motor vehicle activity has become a grave challenge to be solved in Bangalore during the last and this decade. This has

brought a serious range of socio-economic, environmental, health, and welfare impacts on environmental degradation. The study of rapid growth of motor vehicles in Bangalore is important not only because of their locally harmful air pollution effects, but also because of their regional and global impacts.

About Bangalore city

Commonly known as Bangalore is the capital of the South Indian state of Karnataka. It has a Population of about 8.42 million and a metropolitan population of about 8.52 million, making it The third most populous city and fifth most populous urban agglomeration in India. Located in southern India on the Deccan Plateau, at a height of over 900 m (3,000 ft.) above sea level, Bangalore is known for its pleasant climate throughout the year. Its elevation is the highest among the major large cities of India the total area of Urban Bangalore comprises of about 741 km² (286 sq. miles), with vehicle registration starting with KA (KARNATAKA).

The problem

The increases in population, migration, uncontrolled urban expansion, income, economic growth, energy consumption and mobility have created a serious for air pollution problems, in cities throughout the world. The study is to find the emissions from the vehicles and their impact on the environment. This deals with the present scenario of air pollution and the effects on environment in Bangalore city. The worst thing about vehicular pollution is that it cannot be avoided as the vehicular emissions are emitted at the near ground level where we breathe. The problem of vehicular air pollution especially relates to Bangalore.

AIR POLLUTION FROM TRANSPORT SOURCES

Air pollution caused by vehicles

Transportation is one of the major and important of economic activity and beneficial social interactions. **Air pollution** is addition of any harmful gaseous, liquid or solid particles or substances to the atmosphere, which causes the damaging of the environment, human health on quality of life in urban area that can endanger the health of human beings, plants animals, or damage materials reduce visibility or release undesirable odors. By this one of the great problems faced in urban areas throughout the world is the increase in vehicles due to imbalance between the public transport and the increase in population, mobility and last mile connectivity. This increase in the number of vehicles has lead to increase in congestion and the increase in pollution by the private vehicles.

MOBILITY AND AIR POLLUTION

In recent years due to increase in the number of vehicles has shown drastically in, levels of air, noise, and sight pollution were much higher in all urban centers today. Due to increase in automobiles on the road today we experience higher levels of pollution than before. The automobile is one of the major sources, probably the leading contributor pollution in the cities. The transportation is of the major source for the economic activity and redistribution of resources among people. But transportation sector is a major source of air pollution in Bangalore, it is estimated that the account for nearly all of carbon monoxide (CO), more than 80% of nitrogen oxides (NO_x), 40% of volatile organic compounds (VOC), 20% of sulfur dioxide (SO₂), and 35% of PM₁₀ in 1998. The growing automobiles have lead to

problems of congestion, accidents, and lack of security due to automobiles are worrisome. Therefore to reduce adverse environmental impacts and other negative effects of transportation without giving up the benefits of mobility. As the increasing geographic dispersion of Bangalore population is also likely to increase aggregate transportation demand, since the greater number of trips will also be longer and public transport will be less efficient and universal.

SOURCES OF POLLUTION

Pollution from 2-wheelers: Two-wheelers account for about 72 percent of the total vehicular population in Bangalore. Because of inherent drawbacks in the design of 2- stroke engines, 2-wheelers emit about 20-40% of the fuel unburnt/partially burnt. Presently, two-wheelers account for more than 65% of the hydrocarbons and nearly 50% of the carbon monoxide in Bangalore. As these emissions are less visible, the general public is not aware of the role of 2-wheelers in the deteriorating air quality in the city.

Pollution from 3-wheelers: Of the 1, 15,401 three-wheelers in Bangalore nearly 3 percent of the total population of vehicles, they are petrol-driven, powered by 2-stroke engines. These vehicles are also high emitters of carbon monoxide and hydrocarbons.

Pollution from 4-wheelers: The Bangalore city is having 7, 39,667 vehicles on the roads (Jeep-9104, Taxi-32818 and Cars-697745) as it consist of both petrol and diesel driven vehicles. It excludes the floating vehicles in the city area. These vehicles are also high emitters of carbon monoxide and hydrocarbons which pollutes the air. The city is having 18 percent of 4 wheelers which occupies maximum space on the road, it is one of the air pollutants in the city.

MATERIALS AND METHODS

At present pollution problem has come in different ways like water, noise, land, air, ocean, river, etc. The only solution is to reuse & reduce the pollution. One of the main control for air pollution is the elimination or reduction of fossil fuels and go for alternative fuels. Fossil fuel consumption is the main reason for air pollution problems in cities throughout the world.

A case study has made to know the emissions from the vehicles and their impact on the environment. In Bangalore. Automobile exhaust pipes are at ground level where we breathe.

1. The number of different types of vehicles in Bangalore.
2. To identify the different types of pollutants coming from automobile exhaust Bangalore city.
3. To forecast and suggestion for controlling automobile exhaust in Bangalore city.

DETRIMENTAL EFFECT OF AIR POLLUTION, CORROSION ON BUILDING MATERIALS AND HISTORICAL STRUCTURES.

MATERIALS AFFECTED

In fact, all most all materials are affected by the deposition of acid, but the degree of damage or intensity may be varied. Some of them are more susceptible to the affect such are Carbon, Steel, Zinc, Nickel, Limestone, Marble, Paints and some plastics. Basically metallic materials are spoiled due to corrosion. Oxygen and moisture are the chief agents responsible for corrosion. Submerged structures like foundations and pipes will also be affected by acidified waters due to corrosion caused by acid attack.

THE CHEMISTRY OF CORROSION

Corrosion causing acids may attack the material both in wet and dry form. Some of the pollutants in the gaseous form may fall close to the source of emissions causing direct damage. Sulphur dioxide frequently falls

as dry deposition within 30 km of its source. Wet deposition of acids occurs when the pollutants are released in to atmosphere. They react with water vapor present in clouds to form dilute acids. Sulphur dioxide, nitrogen dioxide, carbon dioxide are the most responsible pollutants causing damage to the material. The intensity of damage caused by sulphur dioxide is more compared to the other pollutants. In fact in the reaction of the materials with pollutants many variables take place.

AFFECT OF AIR POLLUTION ON MATERIALS

The damage due to air pollution on materials is really a serious concern since the service life of buildings is remarkably reduced. It is true that the intensity of manmade pollutants on building degradation is more than the impact of natural pollutants. Most importantly the affects of soiling, degradation, corrosion and erosion caused by So₂ are very much serious. The effect of air pollution on materials may be seen in terms of discoloration, material loss, structural failing and soiling.

MAJOR AIR POLLUTANTS – AFFECT

Air pollutants deteriorate by five ways such as abrasion, deposition and removal, direct chemical attack, indirect chemical attack and corrosion. Air pollution is directly responsible for economic losses in urban areas. The atmospheric deterioration of materials are caused due to moisture, temperature, sunlight, air movement and the position of the materials.

The effect of air pollution on materials

MATERIAL EFFECTED	RANGE OF SENSITIVITY
Brick	very low
Concrete	low
Mortar	moderate to high
sandstone, limestone, marble	high
Unalloyed steel	high
Stainless steel	very low
Nickel and nickel-plated steel	high
Zinc and galvanized steel	high
Aluminum	very low
Copper	low

Indian Ambient Air Quality Standards

The Central Pollution Control Board in India has set up ambient air quality standards with regard to permissible concentration of the following pollutants:

TABLE : Indian Ambient air quality standards

POLLUTANT	INDUSTRIAL AREA ($\mu\text{G}/\text{M}^3$)	RESIDENTIAL AREA ($\mu\text{G}/\text{M}^3$)	SENSITIVE AREA ($\mu\text{G}/\text{M}^3$)
Sulphur dioxide			
Annual Avg.	80	60	15
24 hrs	120	80	30
Oxides of Nitrogen as NO₂			

Annual Avg.	80	60	15
24 hrs	120	80	30
Suspended Particulate Matter (SPM)			
Annual Avg.	360	140	70
24 hrs	500	200	100
Carbon Monoxide			
8 hrs	5000	2000	1000
1 hr	10000	4000	2000

OUTCOMES

- || Determination of the emission from the vehicles in the Bangalore city like CO, SOX, NOx, PMx, NH3 etc.
- || Calculation of the pollution in Bangalore due to transportation system.
- || Clear picture of ambient air quality in Bangalore city can be obtained.
- || Pollution patterns and concentrations of different pollutants in different parts and elevations of the city can be obtained once after the successful monitoring is done.
- || Climatic and Seasonal effects on emission pollutants concentrations near breathing level.
- || Effects of vehicular pollution in Bangalore can be picturised.
- || Public awareness to ride their vehicles smoothly and to maintain the health of the engine.
- || Behavior of Petrol, Diesel and CNG engines with AGE of vehicle, HAULING, SPEED, STROKES, use of ADULTERED fuels, MAINTAINANCE and KMS DRIVEN can be studied and subject the work for the further researches conducted by KSPCB.
- || After the analysis of the results and based on available reports and analytical studies we can propose some suggestions to various governing bodies in Bangalore.

Suggestion to transport department:

- || To restrict registration of new vehicles

- || To ban the entry of Heavy Motor Vehicle (HMs)
- || To ban the use of two stroke vehicles within BBMP area
- || To ban use of more than 15 years old HMs

Suggestions to Police Department:

- || To plan for regulating the traffic.
- || To impose fine on vehicles violating Emission limits.

Suggestions to BDA:

- || To make more afforestations.
- || The awareness among the public is also important to stimulate the concerned authorities to initiate control and remedial measures.
- || It is necessary that the appropriate governments should initiate substantial measures to control the damage of structures.

HEALTH CONCERNS

People most susceptible to severe health problems from air pollution are:

- || With heart disease such as coronary artery disease or congestive heart failure.
- || Individuals with lung disease such as asthma, emphysema or chronic obstructive pulmonary disease (COPD).
- || Pregnant women

- || Outdoor Individual workers
- || Children under age 14, whose lungs are still developing
- || Athletes who exercise vigorously outdoors.

Our Future

- || For this carbon wedge era we should work together in reducing global warming and other efficiencies by reducing vehicle use across all transport sectors.

CONCLUSION

The rapid population growth of vehicles in multiple ratios continues to be a matter of concern for the Bangalore city as it has manifold effects since the last decade, one of the most important being environment degradation. The unprecedented speed of urbanization of Bangalore has resulted in enormous pressure on the environment with severe adverse impacts in terms of pollution, and today city is considered as one of the most polluted city in the country.

While the projected rate of population increase may be reduced, even moderate population growth is likely to lead to substantial increases due to passenger and freight travel demand in the city, due to introduction of Metro, Monorail, BRTS, fuel price etc.

The increasing geographic dispersion of metropolitan population is also likely to increase

aggregate transportation demand, since the greater number of trips will also belong and public transport will be less efficient and universal.

0. Remote sensing technology can be used to measure the pollutant level from vehicle's exhaust while vehicle are in motion.

1. Modification engine: As per Motor Vehicle Act all vehicle manufacturers have to conform latest Bharath standards.

2. Avoiding unnecessary driving to reduce vehicle emissions

3. No Vehicle day

4. Celebration of Bus Day:

5. Car Pooling:

6. Emission test by RTO:

7. Ban of vehicles more than 15 years of age: The rapid growth of population and motor vehicles in multiple ratios is the main concern. City has manifold its effects from last 20 years on all types of pollution, From the research report it is clear that vehicular growth has been increasing year by year with Increasing in the human population it is necessary for people of Bangalore city make a bit in reducing the pollution by minimizing the extensive use of private/own vehicles and use maximize use of public transport system.